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09/696,956	10/27/2000	Daniel E. Fisher	001.00001	3189

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EXAMINER	
CHOW, CHARLES CHIANG	

ART UNIT	PAPER NUMBER
2685	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/698,956	Applicant(s) FISHER, DANIEL E.	
	Examiner Charles Chow	Art Unit 2685	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2004*.

2a)☐ This action is FINAL. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *3-8,18 and 19* is/are allowed.

6)☒ Claim(s) *1,2,9-12,14-17 and 20-23* is/are rejected.

7)☒ Claim(s) *13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action
(Amendment Received on 10/15/2004)

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claim 16 is rejected under 35 U.S.C. 102(b) as being anticipated by Johnson (US 4,245,220).

Regarding **claim 16**, Johnson teaches a method comprising the step of capturing frequency difference that is present at first and second antennas (transducer antennas, 1, 2, Fig. 1-2, the captured frequency difference $\Delta f \times (t/T)$ from fo, col. 2, lines 7-16), producing an information signal onto which the frequency difference has been modulated (the mixer 3 receives carrier frequencies from mixers 4, 10, Fig. 2, to produce frequency difference which is modulated by fb, col. 2, lines 35-48), analyzing the information signal to determine the frequency difference (the analyzing received echo slots in col. 1, lines 28-33; the analyzing frequency difference between transducers 1, 2, is $\Delta f \times (t/T)$ in col. 2, lines 7-16; the analyzing using processor for the signals from filter bank in col. 2, lines 54-60; the frequency difference in col. 3, lines 55-60; the Δf in col. 2, line 61 to col. 3, line 65).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-2, 9, 14-15, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson-'220 in view of Kitayama et al. (US 5,107,522).

Regarding **claim 1**, Johnson teaches a receiver comprising an rf bridge ((Fig. 2, col. 2, lines 35-48, col. 1, line 4-33), first and second frequency converters coupled to respective first and second antennas (the antenna transducers 1, 2, at A, B, are coupled to the first, second, mixer converters 10, 4, Fig. 2), a third frequency converter coupled to the outputs first and second frequency converters (frequency converter 3 coupled to the outputs of first, second, converters 10, 4, via filter 11-12, Fig. 2). Johnson teaches a processor coupled to the filers bank 7, 8 (col. 2, lines 55-60). Johnson fails to teach the processor and an rf bridge coupled to the processor to receive reference signal from the processor, However, Kitayama teaches these features, Fig. 11, the microprocessor 307 coupled to frequency conversion 1, via reference oscillator 324, via Vco 309 having the reference oscillator 324 controlled by microprocessor 307, col. 20, lines 44-68; abstract, col. 3, lines 30-68, col. 4, lines 46-51). Kitayama teaches the simple, low cost oscillator frequency control via microprocessor (col. 3, lines 8-38), for the controlling of Johnson's oscillator frequency fb. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson with Kitayama's microprocessor controlled oscillator signal for frequency conversion 1, such that the frequency error could be simply directly control by microprocessor, with low cost.

Regarding **claim 2**, Johnson teaches the first and second frequency converters (10,4) receive

respective first and second signals from the respective first and second antennas (transducer 1, 2), the third frequency converter (3) heterodynes signals from the first and second frequency converters (signal from mixer 4, 10 via filters 11-12), to provide a signal that is characterized by a frequency difference modulated onto the reference signal (the modulated frequency difference at the output of mixer 3 is modulated by frequency fb), the frequency difference being a difference between a frequency of the first signal and a frequency of the second signal (the frequency difference of the two transducer received signals having value of $\Delta f \times (t/T)$ in col. 2, lines 7-16; the analyzing using processor for the signals from filter bank in col. 2, lines 54-60; the frequency difference in col. 3, lines 55-60; the Δf in col. 2, line 61 to col. 3, line 65).

Regarding **claim** 9, Johnson teaches a receiver comprising an rf bridge (Fig. 2), circuitry to detect a frequency difference (the circuitry in Fig. 2 for detecting the frequency difference of the two transducer received signals having value of $\Delta f \times (t/T)$ in col. 2, lines 7-16; the analyzing using processor for the signals from filter bank in col. 2, lines 54-60; the Δf in col. 2, line 61 to col. 3, line 65), from the information signal based on the signal from the clock source (oscillator frequency fb). Johnson teach the processor coupled to the rf bridge to receive an information signal from rf bridge (the processor coupled to the filers bank 7, 8 in col. 2, lines 55-60). Johnson fails to teach a digital frequency source to generate a reference signal based on a signal from clock source, the reference signal being coupled to the rf bridge. However, Kitayama teaches these features, Fig. 11, the microprocessor 307 coupled to frequency conversion 1, via reference oscillator 324, via Vco 309 having the

reference oscillator 324 controlled by microprocessor 307, col. 20, lines 44-68; abstract, col. 3, lines 30-68, col. 4, lines 46-51). Kitayama teaches the simple, low cost oscillator frequency control via microprocessor (col. 3, lines 8-38), for the controlling of Johnson's oscillator fb. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson with Kitayama's microprocessor controlled oscillator signal for frequency conversion 1, such that the frequency error could be simply directly control by microprocessor, with low cost.

Regarding **claim 14**, Johnson teaches the rf bridge (Fig. 2) include first and second rf frequency converters (10, 4) coupled to respective first and second antennas (antenna transducers 1, 2); and a third rf frequency converter coupled to output of the first and second rf frequency converter (mixer 3 coupled to the output of mixer 10, 4, via filter 11, 12).

Regarding **claim 15**, Johnson teaches the first and second frequency converters (10,4) receive respective first and second signals from the respective first and second antennas (transducer 1, 2), the third frequency converter (3) heterodynes signals from the first and second frequency converters (signal from mixer 4, 10 via filters 11-12), to provide a signial that is characterized by a frequency difference modulated onto the reference signal (the modulated frequency difference at the output of mixer 3 is modulated by frequency fb), the frequency difference being a difference between a frequency of the first signal and a frequency of the second signal (the frequency difference of the two transducer received signals having value of $\Delta f \times (t/T)$ in col. 2, lines 7-16; the analyzing using processor for the signals from filter bank in col. 2, lines 54-60; the frequency difference in col. 3, lines 55-60; the Δf in col. 2, line 61 to col. 3, line 65).

Regarding **claim 21**, Johnson teaches a receiver comprising the rf bridge (Fig. 2), an rf bridge (Fig. 2) that includes plurality frequency converters (mixer 10, 4, 3) and two antennas (antenna transducers 1, 2), the rf bridge providing an information signal to the processor that is characterized by the frequency equal to the reference frequency modulated by a frequency difference (the processor coupled to the filers bank 7, 8 in col. 2, lines 55-60; the mixer 3 output difference frequency modulated by fb, col. 2, lines 35-48; the two signals are then mixed giving rise to a frequency difference in col. 3, lines 1-10; the calculation of frequency difference in col. 3, lines 50-65), frequency difference being a difference between a frequency (fo) of a signal received at one of the two antennas and a frequency and a frequency (fo + Δf x (t/T) of a signal received at another of the two antenna (the two signals received via two antenna transducers 1, 2 at A, B, Δf x (t/T) in col. 2, lines 7-16). Johnson fails to teach the a processor providing a reference signal characterized by a reference frequency. However, Kitayama teaches these features, Fig. 11, the microprocessor 307 coupled to frequency conversion 1, via reference oscillator 324, via Vco 309 having the reference oscillator 324 controlled by microprocessor 307, col. 20, lines 44-68; abstract, col. 3, lines 30-68, col. 4, lines 46-51). Kitayama teaches the simple, low cost oscillator frequency control via microprocessor (col. 3, lines 8-38), for the controlling of Johnson's oscillator frequency fb. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson with Kitayama's microprocessor controlled oscillator signal for frequency conversion 1, such that the frequency error could be simply directly control by microprocessor, with low cost.

3. Claims 10-11, 17, 20, 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson-'220 in view of Kitayama, as applied to claim 9 above, and further in view of DesJardins (US 5,570,099).

Regarding **claim 10**, Johnson, Kitayama, fail to teaches the circuitry to detect includes a first fourier transformer having a first frequency and a second fourier transformer having a second center frequency, the first center frequency being different than the second center frequency. However, DesJardins teaches these features, the first, second, fourier transforms 18, 34, for respective first, second, center frequency associated with the different center frequencies of each FIR filters 20, 36, for determining of the transmitter location from two antenna signals (abstract, Fig. 1-3, col. 3, lines 35-59, col. 2, line 65 to col. 3, line 25; col. 5, lines 37-45). Desjardins teaches the measuring, calculating, of the range, and the difference in range ΔR, the frequency difference of arrival (col. 1, lines 3-43), with accuracy to minimize error (col. 3, lines 17-31) for locating a transmitter. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson with DeJardins accurate digital processing Hilbert transforms, FIR filter for two receiving path, such that the calculated frequency difference, range, information could be accurate.

Regarding **claim 11**, DesJardins teaches the circuitry to detect includes a digital frequency generator (analog to digital converters 16, 32), that generates a first digital at the first center frequency coupled to the first fourier transform, and a second digital signal at the second center frequency coupled to the second fourier transform (the Hilter transforms 18, 34, coupled to the respective A/D converter 16, 32 with first center frequency for FIR filter 20, and second center frequency for FIR filter 36, abstract, Fig. 1-3, col. 3, lines 35-59, col.

2, line 65 to col. 3, line 25; col. 5, lines 37-45).

Regarding **claim 17**, DesJardins the step of analyzing (Fig. 3) include forming a first fourier transform (Hilbert transform 18) of the information signal at a first center frequency (center frequency used by FIR filter 20), forming a second fourier transform (Hilbert transform 34) of the information signal at a second center frequency (center frequency used by FIR filter 36), the second center frequency being difference than the first frequency (the center frequency for FIR filters 20 is for frequency of receiver 10 which is different from center frequency of FIR filter 36 which is for frequency of receiver 12).

Regarding **claim 20**, DesJardins teaches a step of determining a range between an emitter generating the signal and a point between the first and second antennas (col. 5, lines 36-45).

Regarding **claims, 22, 23**, DesJardins teaches the determining a range based on the frequency difference (the equation has the relationship for the range difference R1-R2 and the frequency difference v=f* (R1-R2)/c in col. 1, lines 9-27; the correcting frequency difference v in col. 5, lines 11-45; the determining of the accurate value of frequency difference v in col. 6, lines 51-62).

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson-'220 in view of Kitayama, DesJardins, as applied to claim 10 above, and further in view of Maitre et al. (US 4,903,030).

Regarding **claim 12**, DesJardins teaches the first and second fourier transformation (Hilbert transform 18, 34). Johnson, Kitayam, DesJardins, fail to the frequency discriminator coupled to the fourier transform. However, Maitre teaches these features, the frequency discriminator 27 (figure in cover page) is coupled to the frequency analysis 26 (figure in cover page), for

the detecting of angular discrimination of targets by airborne radar (abstract; Fig. 1-3; col. 1, line 11 to col. 24). Maitre teaches the Doppler frequencies can be selected with extreme precision for the very fine angular discrimination (col. 1, lines 41-45), such the angle of signal arrival from target can be very finely measured. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Johnson, Kitayam, DesJardins, with Maitre's discrimintor coupled to frequency analysis, such that the angle of signal arrival could be accurately measured.

Claims Objection

5. Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art fails to teach the <u>structure</u> in claim 13, and the equation for frequency difference in claim 19.

Claims allowable

6. Claims 3-8, 18-19 are allowable over the prior art of record.

The following is the examiner's statement for the reasons of allowance:

Claims 3-8, 18-19 are allowable over the prior art of record, the prior art fails to teach singly, particularly, or in combination, the subject matter, for the **structures** in claims 3, 5, 6, and the **wherein the integration interval is inversely proportional to a difference between the first center frequency and the second frequency** in claim 18. The dependent claims are also allowable due to their dependency upon the independent claims above.

The closest prior art to Johnson (Us 4,245,220) teaches the first, second, third frequency converters having two antennas for calculating the frequency difference to determining the

target location (abstract, the frequency difference Δf x (t/T) in col. 2, lines 7-16; the analyzing using processor for the signals from filter bank in col. 2, lines 54-60; the frequency difference in col. 3, lines 55-60; the Δf in col. 2, line 61 to col. 3, line 65). Johnson fails to teach the **structures** in claims 3, 5, 6, and the **wherein the integration interval is inversely proportional to a difference between the first center frequency and the second frequency.**

Other prior arts are considered but they do not teach the above claimed features in claim 3, 5, 6, 18.

Stone (US 3,680,124) teaches the determining of the azimuth information from the signal difference from the two antennas A1-A2. Stone teaches the third frequency converter 71 coupled to the first, second frequency converter 65/67. Stone does not teach the fourth frequency converter, the additional up converter/down converter coupled to the RF bridge and processor having first, second fourier transform center frequencies.

Cash (US 4,509,052) teaches the reinterferometer/Dopper target location system (abstract, 1-6), frequency converters 10/12, for measuring elevation angle, azimuth angle and range (abstract, summary of invention, his claims 1, 10), the processor 34 to analyze frequency difference according to equations (col. 7, lines 3-24).

DesJardins (US 5,570,099) teaches the accurate range and frequency calculation FDOA, using digital signal processing, Hilbert transforms, FIR filters, to analyzing two antenna received signals, to locating a transmitter (abstract, Fig. 1-3, col. 3, lines 35-59, col. 2, line 65 to col. 3, line 25; col. 5, lines 37-45; col. 1, lines 3-43; col. 3, lines 17-31).

Any comments considered necessary by applicant must be submitter no later than the

payment of the issue fee, and to avoid processing delays, should preferably accompany the issue fee. Such submission should be clearly labeled "comments on statement of reasons for allowance".

Response to Arguments

7. Applicant's arguments with respect to claim 1-2, 9-12, 14-17, 20-21 have been considered but are moot in view of the new ground(s) of rejection.

Regarding applicant's argument for the no teachings for the frequency difference which has been modulated, the third frequency converter, the reference signal from a processor, and the motivation, the ground of rejection has been changed to include Johnson (US 4,245,220), Kitayama et al. (US 5,107,522), Desjardins (US 5,570,099).

Johnson teaches the third frequency converter (3) coupled to the first and second frequency converters (10, 4) for measuring the frequency difference to determine the target bearing, location (abstract, Fig. 2, $\Delta f \times (t/T)$ in col. 2, lines 7-16; the analyzing using processor for the signals from filter bank in col. 2, lines 54-60; the frequency difference in col. 3, lines 55-60; the Δf in col. 2, line 61 to col. 3, line 65).

Kitayam et al. teaches the microprocessor controls reference signal 324, Fig. 11, for controlling, generating oscillator signal from Vco 309, to frequency converter 1, rf bridge (abstract, Fig. 11, Fig. 12, col. 10, line 44 to col. 11, line 10).

DesJardins teaches the first, second, fourier transforms 18, 34, for respective first, second, center frequency associated with the center frequencies of each FIR filters 20, 36, for determining of the transmitter location from two antenna signals (abstract, Fig. 1-3, col. 3,

lines 35-59, col. 2, line 65 to col. 3, line 25; col. 5, lines 37-45). Besides, the independent claims are quite brief, broad, and having too little invention detailed features.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Chow whose telephone number is (703)-306-5615.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban, can be reached at (703)-305-4385.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to: (703) 872-9306 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Charles Chow C.C.

February 4, 2005.

EDWARD F. URBAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600